"I AM NOT GOING BACK-LAH"
AN ECONOMETRIC ANALYSIS OF POST-STUDY INCLINATIONS AMONG MALAYSIAN STUDENTS IN THE UNITED STATES

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Abstract

The research in this paper investigates the post-study inclinations of Malaysian students currently studying in the United States after they complete their desired level of education in the US by estimating a multinomial logistic regression. As in previous studies, students studying abroad are thought to be a source of brain drain among developing countries. In a survey conducted for this research, students were asked if they are inclined to return to Malaysia immediately, remain in the United States temporarily or remain in the United States permanently. It was found students who are scholars sponsored by scholarships from various institutions in Malaysia including the Malaysian government are more inclined to return to Malaysia immediately suggesting that such scholarship programs are viable policy tools to counter the brain drain phenomenon among Malaysian students studying abroad. Interestingly, it is also found that students who did not attend public national schools in Malaysia are more inclined to remain in the United States thus begging the question if the structure of Malaysia's schooling system has an influence on Malaysia's brain drain predicament. This finding though, would merit further research. It is also found that even after controlling for potential endogeneity, students who had internship experience in Malaysia are less inclined to remain in the United States. Lastly, through a series of different hypothetical scenarios, it is identified that students who desire to pursue an education level beyond a bachelor's degree to be more inclined to remain in the US permanently if granted permanent residence.

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Contents

Introduction

Brain drain is the emigration of high skilled individuals aged 25 or above with an academic or professional degree beyond high school. (World Bank, 2011; Docquier and Rapoport, 2004, 2011). One major cause of brain drain happens when students from developing countries studying in developed countries decide to remain in their host countries after completing their studies (Baruch, Budhwar and Khatri, 2007). Malaysia is one of these developing countries that have been experiencing this phenomenon.

The research in this paper investigates the inclination of Malaysian students to remain in the United States after completing their desired level of education at the tertiary level. In 2010, the total number of Malaysian students studying abroad was 79,524 out of which 6,100 were studying in the United States. By 2012, that number increased to 6,743 (IIE, 2012). Since there are no official estimates of the number of Malaysian students who decide to remain in the United States after completing their studies, studying students' inclinations to remain is important to understand the potential brain drain that will occur among these students. Additionally, it is important to study this group of students because when these students graduate with a tertiary degree and decide to remain in the United States, they will fit the World Bank's definition of brain drain.

Studying the patterns and trends of brain drain is important especially in the context of a developing country such as Malaysia. Brain drain will usually result in the loss of human capital that is vital for economic growth. The brain drain phenomenon is a serious and pressing issue for Malaysia because it is losing people at a higher rate than other nations. The World Bank

estimates that one in every ten skilled Malaysians born in Malaysia elects to leave the country, which is double the current world average of brain drain (World Bank, 2011).

The cost of brain drain is relative to the human capital base a country possesses. At any given level of brain drain, the impact of brain drain will be higher the narrower the human capital base. This is precisely the case pertaining to Malaysia. In the period of 1990 to 2000 for example, other countries within the Asian region experienced higher rates of diaspora than Malaysia (World Bank, 2011). Yet, despite Malaysia's lower emigration rate compared to those countries, Malaysia's brain drain intensity relative to its domestic human capital base is actually higher. This highlights that Malaysia's stock of human capital has not grown as rapidly as in other Asian countries.

Another issue worth mentioning here is that Malaysia is experiencing a net loss of human capital. This is because while Malaysia is experiencing a large outflow of human capital which mainly consists of skilled migrants, Malaysia is only able to attract low-skilled foreign labor. It is estimated that 2.4 million foreign workers are currently working in Malaysia, both legally and illegally and that these workers are largely low-skilled workers holding jobs mainly in agriculture, manufacturing and construction (Junaimah and Yusliza, 2011).

The economic impact of brain drain in Malaysia is also well documented. Using the endogenous growth model, Harnoss (2011) found that emigration of skilled Malaysians since 1980 has cost an estimated 1.2 percent to 2.2 percent of per capita income in 2000 and 0.7 percent to 1.6 percent of per capita income in 2010. According to Harnoss, this reduction of the impact of the emigration of skilled Malaysians on per capita income from 2000 to 2010 shows that there were relatively more skilled workers in 2010 than in 2000.

Similar to that of Baruch, Budhwar and Khatri (2007), the research in this paper focuses on brain drain at the individual level. Specifically, this research investigates the factors that affect Malaysian students' inclinations to remain in the United States after completing their studies. To do so, the research in this paper estimates a multinomial logistic regression to identify those factors which influence students' inclinations to stay. After estimating the multinomial logistic regression, the research in this paper proceeds to analyze potential endogeneity that exists in the model.

The research in this paper also estimates a number of simple logistic regression models to identify the characteristics of students who are most likely to change their mind or inclinations given different hypothetical scenarios. For example, in one simulation, students were asked if they would be more inclined to remain in the United States permanently if granted permanent residence.

The research in this paper incorporates the push-and-pull model used by Baruch, Budhwar and Khatri (2007) to estimate a student's inclination to remain in the host country. By adding wage expectations as in Janger and Nowotny (2013), this research will also be able to estimate whether monetary factors influence the students' inclinations to stay in the U.S. In this perspective, this research will also contribute to the general literature on the push-and-pull model by incorporating monetary factors.

In the context of policy making, this research will have important policy implications. By studying students' inclinations to remain in the US as well as the underlying factors which contribute to those inclinations, policies can be designed to anticipate potential brain drain arising from those factors. In addition to this, by defining different hypothetical scenarios, it

might be possible to identify policies that can be designed to counter the brain drain phenomenon in Malaysia as well as to foresee brain drain trends in different scenarios. Thus, the research in this paper can be considered to be a "forward-looking" approach.

Literature Review

The push-and-pull model (Baruch, 1995) lays the theoretical foundations of this research. Baruch found that the model can help explain migration movements across borders. Additionally, Mazarol and Soutar (2002) found that the model can also explain students' international migration behavior. The push-and-pull model defined by Baruch is based on Lewin's (1951) field theory in which individuals experience opposing forces in making a decision regarding whether or not to move to a different country. In simple terms, it means that there are some factors that push an individual to move away from a country and there are some factors that pull an individual towards one.

The push-and-pull concept can also be viewed strictly in the economic or monetary sense. Two existing models can be used to explain this. One is the Roy model (Roy, 1951) used by Borjas (1992) to study migration. Using the conceptual framework of the Roy model, Borjas provided an empirical analysis of internal migration flows using data from the National Longitudinal Survey of Youth. The empirical study highlighted that regional differences in the returns to skills to be a major determinant of both the size and skill composition of internal migration flows. Individuals whose skills are mismatched with the reward structure offered in their home state of residence are most likely to migrate, and these individuals often migrate to states which offer higher rewards. If viewed from the push-and-pull model perspective, lower returns to skills in a home country can be seen as a push factor for migration decisions.

The second model which also explains migration from a monetary perspective is the Harris-Todaro model which was first defined in Todaro (1969). In its conventional form, the model assumes that migration decisions of individuals between rural and urban areas are based on expected income differentials. If applied to the context of migration across countries, this model predicts that migration will occur from countries with lower expected wages to countries with higher expected wages. Similar to the Roy model discussed above, the differentials in expected wages in the Harris-Todaro model can also be viewed from a push-and-pull model perspective strictly in a monetary sense.

The empirical studies related to this research can be divided into two different categories. One category focuses on foreign students' immigration to a host country while the other category focuses on the foreign student emigration out of the home country. In the former category, Huang (1988), by using pooled data for 25 countries from 1962 to 1973, analyzed foreign students' decisions to return home or remain in the US after completing their studies in the US. However, unlike the research in this paper, Huang performed his analysis at the macro-level using economic explanatory variables such as income differentials as well as socio-political variables. Huang's model also incorporated constraints imposed by U.S immigration policies and concluded that his model is capable of explaining the pattern of non-return by foreign students from different countries of origin over time.

While Agarwal and Winkler (1984, 1986), and Agarwal and Huang (1987) estimated their models by incorporating US immigration policy constraints such as labor certification and financial sponsorship policies, Huang (1988) extended the model further by incorporating non-pecuniary factors. The logic behind Huang's approach was that an individual's economic considerations are not limited to purely income differentials. Huang argued that some socio-

psychological factors although non-pecuniary can also be viewed broadly as economic considerations. By including non-pecuniary factors into the model, Huang found that income differentials did not play a predominant role in determining student brain drain. Huang also found that political and social considerations play no less significant roles than economic variables in motivating the stay of foreign students. In short, Huang found that poor standards of living, low levels of income, surplus labor, the lack of political stability and freedom and high fertility rates are all statistically significant "push" factors for student's emigration. Huang's findings were consistent with Glaser (1978) who reported that income and the quality and quantity of jobs are associated with non-return decisions among students as well as with Kao (1971) who found that income satisfaction and the satisfaction of the American way of life are strong reasons to stay among Taiwanese students.

Similar to Huang (1988), Bratsberg (1995) used student visa adjustments of individuals from 69 source countries to proxy the non-return rate for foreign students in the US. Bratsberg estimated the non-return rate for students by looking at F-1 visa issued from 1970-1975 and their adjustment to permanent residency by 1986. Interestingly, the non-return rate was found to be 14.13 percent for Malaysian students. Bratsberg also found that variation in non-return rates across source countries is explained by the differences in economic and political conditions in the source country. Furthermore, Bratsberg found that scholarships and financial aid from home country to be a significant deterrent of continued stay and this finding was consistent with Huang (1988) and Myers (1972).

The research in this paper derives most similarities with Baruch, Budwar and Khatri (2007). Unlike most of the above studies, Baruch, Budwar and Khatri revolved their analyses around micro-level indicators. In their research, they sampled 949 management students who

studied in the United Kingdom and the United States. A questionnaire was administered in 2003 to Master's students enrolled in business management programs in five universities – three in the United Kingdom and two in the United States. The reason why Master's students were chosen was because they were nearing the completion of their education and may be looking forward to starting their career. Interestingly, 16 Malaysian students were also sampled in the process. Baruch, Budhwar and Khatri found that four variables were statistically significant in affecting a student's inclination to stay. These were 1) perception of job market opportunities 2) the adjustment process of the student in the host country 3) the strength of family ties of the student in the host country and 4) the social support. Their study also found that students who perceived the cultural differences between the US and their home countries to be too large and significant are more inclined to return home. For example, Indian students were the least inclined to return to India.

The research by Baruch, Budhwar and Khatri (2007) also differs from previous studies in another aspect. Unlike the studies discussed earlier, Baruch, Budhwar and Khatri have studied a student's inclination to remain in the host country (before migration) rather than using data on students who have already made their decisions to remain in their respective host countries. The research in this paper is thus similar to Baruch, Budhwar and Khatri in this aspect as well as it examines the "forward-looking" inclinations rather than "backward looking" decisions. The results of this analysis have important policy implications. Identifying the underlying factors that affect a student's inclination to remain in the host country can be useful for designing policies to potentially mitigate this inclination before brain drain occurs. This is particularly important for

Malaysia which has through its Talent Corporation invested heavily on policies and attempts to attract Malaysian talent to return back to contribute to its development.[1]

Still, there are more potential extensions to the model presented in Baruch, Budhwar and Khatri (2007). For example, their model does not incorporate wage differentials to estimate the monetary tradeoffs and opportunity costs that are involved in a student's decision whether to stay or return to his or her home country. However, in such a micro-level analysis wage differentials are difficult to compute unless if a survey is performed to ask students about their expected wage earnings or the minimum wage they are willing to work both in the home and host country. My study will thus extend Baruch, Budhwar and Khatri's approach by incorporating expected wage variables to estimate the monetary influences when a student makes his or her decision.

While the above studies revolve around the foreign brain drain into the United States, it is also necessary to review studies which have analyzed the brain drain trends out of Malaysia. Junaimah (2009) examined the factors that drive the brain drain in Malaysia. However, the study was conducted on a small sample of 150 accounting students and professional accountants. Nonetheless, it is noteworthy to mention that the study found that higher salary and benefits programs and international exposure positively related to brain drain.

Foo (2011) presented an estimate of the stocks and flows of Malaysian born migrants in the world and also studied the different key determinants of high-skilled migration specific to Malaysia. By using four key datasets: the University of Sussex Migration Development Research Centre (MDRC) bilateral migration dataset of 226 countries, the World Bank data used in Parsons et al. (2007), the Docquier et al. (2010) dataset based on 25+ year old highly-skilled

[1] A government linked company established to create talent retention and attraction policies to reverse the brain drain issue in Malaysia.

migrants with gender data and the OECD study by Dumont et al. (2010) on migrants to 89 countries, Foo estimated the stock of Malaysian born migrants in the world. Similar to the estimates of the World Bank (2011), Foo found the stock of Malaysian migrants in key destinations to be close to 900,000 (World Bank estimated it to be 1 million). Foo also found that there is a clear upward trend of overall Malaysian migrant stock and high skilled migrants and that Singapore was the destination for one out of every three high-skilled migrant who decided to leave Malaysia. Foo opined that this upward trend is in line with expectations since Malaysia has become increasingly open to the global economy and more residents will seek opportunities outside of Malaysia. Also, the fact that Singapore accounts as destination for one third of the high skilled Malaysian migrants should not come as a surprise due to the historical and geographical links that both countries share.

Using country level data from different sources, Foo (2011) also investigated the determinants of migration of skilled Malaysians living abroad. In his model, he included variables such as the stock of highly-skilled Malaysian-born migrants in destination country, the weighted distance from Malaysia to destination country, as well as the quality of living index of a country. Foo (2011) found that the GDP per capita of destination country and the quality of living index are positively correlated to the rate of migration for high-skilled migrants born in Malaysia. Foo's study however, does not attempt to establish causalities of the migration patterns out of Malaysia but rather just an explanatory effort to study the relevant effects of proposed determinants of skilled emigration from Malaysia.

In addition to the above findings, Foo (2011) also administered a survey and collected about 194 responses over a period of three weeks. From the survey, Foo found that the top three determinants of migration out of Malaysia are 1) better career prospects overseas 2) sense of

social injustice and 3) more attractive salary/benefits overseas. Interestingly also, Foo found that almost half of the Malaysians based overseas who responded to the survey felt a strong sense of attachment to Malaysia. This is a good indicator, according to Foo (2011) that Malaysians have not given up on returning to Malaysia at some point in their lives.

Unlike Foo (2011) and Junaimah (2009), Tyson et al. (2011) attempted to link economic and educational policies to the current brain drain phenomenon in Malaysia. Tyson et al. argued that the structure of the Malaysian education system and political economy contribute to the country's brain drain. Specifically, Tyson et al. emphasized that the New Economic Policy is a major contributing factor to the current brain drain trends in Malaysia. The NEP policy is an affirmative action policy which offers preferential treatment to Bumiputera Malaysians in areas such as public employment, business opportunities and education. The argument here is that due to preferential policies, non-Bumiputera Malaysians have felt socially discriminated at and thus are more inclined to leave the country for better pastures overseas.

Tyson et al.'s arguments are also supported by the World Bank (2011). By 2010 for example, the share of ethnic Chinese Malaysian migrants in Singapore had risen to almost 90 percent of all Malaysian migrants in Singapore, with the share of ethnic Indians remaining flat at 5 percent. Similarly, based on the US census 2000 data in IPUMS, the World Bank has found that only 10 percent of the Malaysians migrants in the US reported Malay as their mother tongue while over 60 percent reported one of the Chinese languages and another 6 percent reported one of the Indian languages to be their mother tongue. In the context of the push-and-pull model, the NEP policies and the negative externalities it produced is considered to be a push factor when it comes to the brain drain in Malaysia.

Data Collection and Variables of Interests

The data used for research in this paper was obtained by surveying two groups of students. One group of students consisted of Malaysian students currently studying in a tertiary institution in the United States while the other group consisted of US-bound Malaysian students. The latter was defined as Malaysian students who were yet to begin studying in a tertiary institution in the United States but were certain to further their studies in the United States. These students were either enrolled in various academic programs in Malaysia such as the American Degree Transfer Program, the International Baccalaureate (IB) or even the A-levels. Some of these students are also sponsored by institutions in Malaysia whose scholarships require them to further their studies in the United States at the tertiary level. [2] In order to collect data from the two interest groups, a questionnaire survey was administered. The survey is provided in the appendix.

The survey was administered in two ways: a paper version and an online version. The survey began on 26th of May, 2013 and ended on 1st of November, 2013. 588 responses were collected. Respondents were primarily identified through a Facebook group called the "US-bound Malaysian Students" which consists of more than 2000 Malaysian students. Members of the Facebook group were encouraged to share and distribute the survey voluntarily.

Of the 588 responses, 100 responses were collected from the paper version of the survey. Of these 100 paper responses, 26 were collected from a group of US-bound Malaysian students sponsored by the Public Service Department of Malaysia (JPA) who are currently studying at

[2] One example is Taylor's University , see http://www.taylors.edu.my/en/university/

Universiti Tenaga Nasional (UNITEN).[3] These students were mainly engineering majors. The paper questionnaire was administered to these students in June, 2013.

Another 46 of these 100 responses were collected from a group of students comprised of of students sponsored by various institutions. These students were studying at Universiti Teknologi Mara's (UiTM) INTEC.[4] The paper survey for this group of student was administered in July 2013.

Figure 1 shows the theoretical model as well as the different categories of variables which are potential push and pull factors used in research in this paper. The following is a thorough explanation of each category of variables that are included in the model.

Adjustment process to living in the United States: was measured by two variables which were combined into one variable through factor analysis. Factor analysis is usually used for two reasons. One reason for using factor analysis is to create a smaller set of variables from a large set of variables that are preferably uncorrelated with each other. A second reason for using factor analysis is to create indexes of variables that measure conceptually similar things (Kim and Mueller, 1978). The two variables that were combined in this research were the students' perceived level of English proficiency and their level of adjustment to living in the United States. Both variables were measured on a (1) to (5) scale. Table 11 presents the results from the factor analysis process described here.

Family ties: consists of two dummy variables. The first dummy variable indicates if the student has relatives or siblings currently studying or living in the United States. The second

[3] A private university in Malaysia. See http://www.uniten.edu.my/newhome/content_list.asp?ContentTypeid=99
[4] One of the colleges in UiTM which conducts programs for selected scholars by the Malaysian government

dummy variable indicates if most of the student's immediate family members are still living in Malaysia.

Demographics: consists of 4 different dummy variables. One dummy variable designates if the student is a Bumiputera. Another denotes if the student is a sponsored scholar. The other two dummy variables indicate if the student is a male and if the student comes from a rural area in Malaysia respectively.

Academic demographics: consists of 3 dummy variables. One dummy variable indicates if the respondent did not attend a public national school in Malaysia. This includes students who come from vernacular schools, private schools, international schools as well as home-schooled students. Another dummy variable indicates if the student is pursuing a Science related academic field. This includes students who are pursuing applied as well as pure sciences. The third dummy variable indicates if the student's desired level of education to complete is beyond a bachelor's degree**.**

Perceptions on living conditions in the United States and Malaysia: were measured in nine different areas which include, economic conditions, political conditions, quality of education, job prospect, easiness to raise a family, culture, inter-racial relations, gender equality and lastly, sexuality justice. Each perception on a specific condition was measured on the scale of (1) to (10). Most of these variables are suggested factors that may have contributed to the Malaysian brain drain by World Bank (2011). These variables were then combined into groups through factor analysis. By performing factor analysis on the list of variables for Malaysia and the U.S, three factors were created. One factor measures the general perception on Malaysia across the 9 conditions. Another factor measures mainly perceptions on the political and

economic conditions in United States. Last but not least, the third factor measures perceptions on social conditions in the United States which were primarily students' perception on gender equality and sexuality justice in Malaysia. Tables 12 and 13 present the factor analysis process for the students' perceptions on living conditions in Malaysia and the United States respectively.

Two monetary variables were also created. One is the minimum annual income at which students are willing to work for in Malaysia. Students were asked to respond in the Malaysian currency, Ringgit. PPP conversions were then made to US dollars. This minimum income will be useful to approximate a student's reservation wage to work in Malaysia. Another monetary variable is the expected wage differential between the United States and Malaysia. Students were asked about their expected income in both countries in each country's respective currency. Those responses were then adjusted to purchasing power parity dollars.

Attachment towards Malaysia: was represented by an individual's perceived moral duty to return to Malaysia**.** A dummy variable was created to represent if the respondent considers himself or herself to have the moral duty to return to Malaysia. This moral duty can be in the form of duty to fulfill contractual obligations especially among scholars or duty to care for their respective families in Malaysia.

*Job market experiences***:** were represented by two dummy variables. One dummy variable denotes if the student had an internship experience in Malaysia. The other dummy variable indicates if the student had an internship experience in the United States.

Last but not least, a categorical variable was created to define each student's post-study inclinations. This categorical variable measures four different post-study inclinations. It measures if the student is inclined to return to Malaysia immediately, remain in the United States

temporarily for less than five years, inclined to remain in the United States temporarily for more than five years and remain in the United States permanently. This variable will be used as the dependent variable in the multinomial logistic regression. Alternatively, another dichotomous dependent variable is created to designate students who are inclined to remain in the United States both temporarily and permanently.

Empirical Analysis

Descriptive Statistics

Table 1 shows the breakdown of post-study inclinations among students across various categories. In the full sample of students, it is found that 51 percent are inclined to remain in the United States temporarily while 13 percent are inclined to remain in the United States permanently. Similar trends are seen in the sub-sample of Malaysian students who are currently studying in the United States. In this sub-sample, 50 percent of the students are inclined to remain in the United States temporarily while 15 percent of the students are inclined to remain in the United States permanently. Both the 13 percent as well as the 15 percent figures can be interpreted as the respective potential brain drain rate in each sample.

It is also interesting to see if there is a systematic difference in inclinations to remain in the United States permanently between Malaysian students currently studying in the United States and US-bound Malaysian students. The results in Table 2 show this. Using a proportion test, it is found that there is a significantly higher proportion of students who are inclined to remain in the United States permanently among Malaysian students currently studying in the United States compared to the US-bound Malaysian students. This difference is significant at the 5 percent level.

Table 1 also includes the potential brain drain rate among scholars and non-scholars. In this case, non-scholars are more inclined to remain in the United States permanently than scholars. The proportion of non-scholars who are inclined to remain in the United States permanently for example is 26 percent while the proportion of scholars who are inclined to remain in the United States permanently 4 percent. The proportion test in Table 2 also shows that this difference is significant at the 1 percent level for both the one-tailed and two-tailed tests. The pattern of the potential brain drain rate among scholars shown here is consistent with the fact that most these scholars are usually required to return to the country to serve their respective sponsors after completing their education since their scholarships are binding ones. Not all scholarships though are binding. This is perhaps why we see that a small portion of scholars are actually inclined to remain in the United States permanently.

Multinomial Logistic Regression

To model the students' post-study inclinations, P is defined as the set of possible post-study inclinations; $\boldsymbol{P} \in \{1, 2, 3, 4\}$. These inclinations include 1) returning to Malaysia immediately 2) remain in the US temporarily for less than 5 years 3) remain in the US temporarily for more than 5 years and 4) remain in the US permanently. By denoting U_{ik} as the utility specific to post-study inclination k, a student will choose decision k if and only if:

$$\boldsymbol{U_{ik} > U_{ij}} \; \forall \; j \neq k$$

$$\boldsymbol{where \; i = 1, 2, 3, 4}$$

Assuming that utility is linear in the observed attributes of post-study inclinations, a representative utility function can be defined as follows:

$$\boldsymbol{U_{ik} = \beta' X_{ik} + \varepsilon_{ik}}$$

where ε_{ik} is the unobserved portion of the total utility. Additionally, if it is assumed that this disturbance is random, independent and identically distributed, it is possible to estimate the probability of a student's inclination by using a multinomial logistic model.

$$\mathbf{Pr}(\boldsymbol{Y_{ik}} = \mathbf{1}) = \frac{\boldsymbol{e}^{(\boldsymbol{\beta_k X_i})}}{\sum_{\boldsymbol{j=1}}^{\mathbf{4}} \boldsymbol{e}^{(\boldsymbol{\beta_j X_i})}}$$

where Y_{ik} = 1 if the student chooses post-study decision k and zero otherwise. The X_i's are the list of independent variables that are included in the model.

Table 3 shows the summary statistics of the variables used in the multinomial regression analysis while Table 4 shows the results from the regression. After performing the multinomial regression analysis, a number of factors with significant explanatory power emerged from the analysis.

After controlling for other variables the following results emerged.

(1) The higher the student's reservation wage to work in Malaysia the more inclined the respondent will be to remain in the United States.

(2) Scholarships are associated with lower inclinations to remain in the United States.

(3) Students who did not attend a public national school in Malaysia are more inclined to remain in the United States

(4) The higher the level of a student's perception on conditions in Malaysia the more inclined the respondent is to return to Malaysia

(5) The higher the level of a student's perception on conditions in the United States the more inclined the respondent is to remain in the United States

(6) Bumiputera students do not exhibit a significant difference in terms of inclination to return to Malaysia compared to non-Bumiputera students.

Furthermore, the model provides some additional partial explanatory power across a number of variables:[5]

(1) Students who desire to pursue an education beyond a Bachelor's degree are more inclined to remain in the United States temporarily but not permanently

(2) Students who are pursuing a science related academic field are more inclined to remain in the United States permanently but not temporarily

(3) Students who have internship experience in Malaysia are less inclined to remain in the United States temporarily for more than 5 years as well as permanently

(4) Students who are inclined to remain in the United States permanently also take in account their perception on the social conditions (sexuality justice and gender equality) in the country

(5) Students who are inclined to remain in the United States also take in account their level of adjustment (measured by English proficiency and perceived level of adjustment) in the country.

The reservation wage proxy used in the model can be understood as the minimum wage at which a respondent would be willing to work in Malaysia. This is in line with the theory that reservation wage is interpreted as a measure of the willingness of a person to work (Holzer, 1986). Prior to searching for a job, an individual decides on the minimum acceptable wage that

[5] "Partial" because that it does not exhibit significance across all dependent categories as shown in the Wald test

the individual will work for. The theory of reservation wage also implies that a high reservation wage makes it less likely that a person will work (Borjas, 2005). In the context of the research in this paper, the reservation wage will be considered to be a measure of willingness to work in Malaysia. An individual's reservation wage to work in Malaysia can be determined by a number of factors. One is the opportunity cost to work in Malaysia that each respondent values monetarily. Higher perceived opportunity cost is thought to increase reservation wage (Van Ophem, Hartog and Berkhout, 2011). The opportunity cost to work in Malaysia in this two country case is the opportunity to work in the United States. In making a decision to work in Malaysia, the respondent will need to forgo his or her opportunity cost to work in the United States. The higher each respondent values the opportunity cost to work in Malaysia the higher it is each respondent's reservation wage to work in Malaysia. Other factors that would also influence an individual's reservation wage are race, age, education level as well as gender. Klasen and Woolard (2000) as well as Walker (2003) discovered that these factors have significant effects on an individual's reservation wage.

To examine the factors contributing to a student's reservation wage, a simple OLS regression with robust estimators is estimated by using the reservation wage as the dependent variable. Table 6 presents the results of this regression. From this regression, it is found that the strongest predictors for reservation wage among the sampled students are 1) gender, 2) desired level of the education and 3) scholarships. Students who desire to pursue an education level beyond a Bachelor's degree for example have a higher reservation wage compared to their counterparts who do not desire to pursue a similar education level after controlling for other variables in this model. If it is interpreted that reservation wage is a monetary measure of opportunity cost then it can be concluded that these students perceive the opportunity cost to

work in Malaysia to be higher than students who desire only to pursue an education at the Bachelor's degree level.

There is also evidence that contractual scholarships are viable tools for Malaysia to retain talent. Students who are sponsored by Malaysian institutions to pursue their study in the United States are less inclined to remain in the United States. The findings here may not support the claim of one minister in Malaysia who argued that scholarship programs may have contributed to the brain drain problem in Malaysia. [6] Still, one weakness in this interpretation is that the model here does not capture the fact that these students actually applied to be sponsored by a scholarship program in Malaysia having already the plan to return to Malaysia in the first place. In other words, the scholarship variable may potentially be endogenous to student's inclination to return to Malaysia.

It is also useful to understand the underlying characteristics of scholars within the sampled studied. Using a logistic regression analysis, the dichotomous dependent scholarship variable is regressed on a series of students' characteristics. Table 5 shows the results of this regression. The results indicate that Bumiputera students' are more likely to be scholars compared to non-Bumiputera students while students who did not attend a public national school in Malaysia are less likely to be scholars. It will thus be interesting for future studies to investigate if contractual scholarships are effective tools to retain talent among students who did not attend a public national school since they (as discussed later in this section) are more found to be significantly more inclined to remain in the United States.

[6] See : http://www.themalaysianinsider.com/malaysia/article/nazri-says-ending-scholarships-may-stop-brain-drain/

That affirmative action policies in Malaysia have resulted in non-Bumiputera emigration out of Malaysia is also strongly contested by the findings in this study. At each category of post-study inclination, given everything else equal, there is no significant difference between Bumiputera and non-Bumiputera students' inclinations to remain in the United States.

However, this research also shed an interesting finding related to how the political economy in Malaysia may have affected the brain drain trends among Malaysians. That the research in this paper found that students who did not attend a public national school in Malaysia are significantly more inclined to remain in the United States controlling for other variables is an important finding. Different schooling experiences in these schools seem to have an impact on a student's inclination to return to Malaysia or remain in the United States. The research in this paper would suggest future studies to investigate this further.

It is also found that the better the conditions in Malaysia are, the more inclined are students to return to Malaysia after completing their education in the United States. Likewise, the better the conditions in United States are, the more inclined are students to remain in the United States. In the context of the push-and-pull model, better conditions in a country can be a pull factor towards moving into the country. It is also interesting to note that students who are inclined to remain in the United States permanently also take into account social conditions such as gender equality and sexuality justice. In other words, they do take into account such aspects when considering living in the country in the long run.

Additionally, it is also found that students who desire to obtain a level of education beyond a Bachelor's degree are more inclined to remain in the United States. While this can be an interpretation that these students will find it more worthwhile to begin working in the United

States and achieve their career goals before returning to Malaysia, this finding also indicates that the Malaysian economy does not have enough jobs for returning high skilled labor. The World Bank (2011) has indicated that while the share of individuals with tertiary education level increased from 16 percent in 2001 to 22 percent in 2008, the percentage of individuals employed in higher skill occupations only changed marginally from 18.4 percent to 19.9 percent during the same period. The World Bank has thus concluded that the share of high skilled occupation has not matched the growth of education. This implies that the growth of domestic employment demand is insufficient to sustain the supply of individuals with higher education.

Interestingly also, it seems plausible that internship experiences in a country may have an impact on a student's inclination to remain in the country. Based on the results from the regression analysis, internships in Malaysia seem to be a deterrent for students to be more inclined to remain in the United States (for more than 5 years and permanently). One possible explanation for this is that visits to Malaysia through internships by these individuals may have somehow increased their inclination to return to Malaysia perhaps by discovering better job prospects in Malaysia than in the United States. Still, similar to the scholarship variable, that a student had an internship experience in Malaysia can be potentially endogenous to his or her inclination to return to Malaysia. In other words, these students actually pursue an internship in Malaysia because they have actually intended to return to Malaysia once they have completed their education.

Logistic Regression Analysis

A separate logistic regression is estimated where the dependent variable is a binary variable which denotes students who are inclined to remain in the United States either

temporarily or permanently. Table 7 shows the results from this regression as well as the average marginal effects of each variable.

It is found that scholarships are the strongest deterrents for students to remain in the United States. The inclination to remain in the United States is reduced by 23 percent for students who are scholars compared to students who are not. In the context of the push-and-pull model, scholarships are a strong pull factor for these students to return to Malaysia. On the other hand, being a student who did attend a public national school in Malaysia increases the student's inclination to remain in the United States by 23 percent also. Additionally, being a student who desires to pursue an education beyond the degree level increases the student's inclination to remain in the United States by 13 percent. The marginal effect of having an internship experience in Malaysia on the other hand is negative but insignificant.

Accounting for Endogeneity of the Scholarship and Internship Variables

To account for the potential endogeneity for both the scholarship and internship variables, a bivariate probit simultaneous-equations model is estimated. The purpose of estimating such a model is to identify if the unobserved disturbances of some explanatory variables in the model defined earlier is potentially correlated to the unobserved disturbances of a student's post-study inclination. If the covariance between both disturbances is significant, it can be concluded that both the explanatory and the dependent variables are endogenous in the model thus weakening the interpretation discussed earlier.

Thus in order to identify potential endogeneity in the multinomial logistic regression model, the following bivariate probit model is specified:

$$y_1 = \alpha_1 y_2 + \beta_{i1} x_{i1} + \varepsilon_1,$$

$$y_2 = \beta_{i2} x_{i2} + \varepsilon_2$$

where each equation is an individual probit function in which the unobserved disturbances have an expected value of zero and a variance of one. The covariance between the two disturbances is defined as, ρ:

$$E[\varepsilon_1 | x_{i1}, x_{i2}] = E[\varepsilon_2 | x_{i1} x_{i2}] = 0$$

$$Var[\varepsilon_1 | x_{i1}, x_{i2}] = Var[\varepsilon_2 | x_{i1} x_{i2}] = 1$$

$$Cov\,[\varepsilon_1, \varepsilon_2 | x_{i1}, x_{i2}] = \rho$$

$x_i's$ in each equation are the list of explanatory variables used in the earlier estimations. In addition to that, the inclusion of the internship variable in the right-hand side of the first equation makes this model a recursive, simultaneous-equations model (Greene, 2003). Two sets of bivariate probit regression are estimated. The first set examines the potential endogeneity between a student's inclination to remain in the United States and his or her having an internship experience in Malaysia before. The second set examines the potential endogeneity between a student's inclination to remain in the United States and his or her being a scholar.

Table 8 shows the results from the bivariate probit simultaneous-equations model used to study the potential endogeneity of the internship variable. The model exhibits a significant correlation coefficient of 0.90. In other words, the unobservable disturbance of one pursuing an internship position in Malaysia is positively correlated with his or her inclination to remain in the United States. The probability of a student who had an internship in Malaysia is also endogenous to his or her inclination to remain in the United States. However, similar to the results in the multinomial logistic regression, students who had an internship experience in Malaysia are less

likely to remain in the United States either temporarily or permanently compared to students who had no internship experience in Malaysia. This implies that an internship experience in Malaysia may in fact potentially motivate or encourage a student to return to Malaysia. Similar ideas have been expressed elsewhere. Minoian and Freinkman (2006), in the context of the Armenian brain drain, suggested that that return visits to home country by Armenian individuals abroad may change their attitudes and motivate them to become more involved with the local Armenian economy.

Table 9 shows the result from the set of bivariate probit simultaneous-equations to study the potential endogeneity between student's inclination to remain in the United States and the probability of a student being a scholar. Unlike the earlier set of simultaneous equations, the Wald statistic for the hypothesis that the correlation coefficient equals to zero is insignificant. In other words, both variables are not endogenous to each other and need not to be estimated simultaneously.

To conclude this section, the inclination of a student to remain in the United States is not endogenous to the student being a scholar. However, the inclination of a student to remain in the United States is in fact endogenous to the student's having an internship experience in Malaysia before. By addressing this endogeneity using the bivariate probit simultaneous equation, it is still found that students who had an internship experience in Malaysia are less inclined to remain in the United States.

Hypothetical Scenarios

It is also interesting to study how students' post-study inclination can be affected given different hypothetical scenarios. To study this, the survey included a series of questions to ask if

the students will be 1) more inclined to remain in the United States permanently if granted permanent residence 2) more inclined to return to Malaysia if the economic situation in Malaysia improves and 3) more inclined to return to Malaysia if the political situation in Malaysia improves. These questions were asked on a scale of 1 to 5 to capture the degree of agreeability of each respondent to each question. 1 for example, denotes "strongly disagree" while 5 denotes "strongly agree". Students whose inclination to either remain in the United States or return to Malaysia changed in each scenario were identified to tabulate a new potential brain drain rate for each separate scenario. In doing this, two bounds are created. The lower bound includes only students who answered "strongly agree" while the upper bound also includes students who answered "agree".

If students are granted permanent residence in the United States, the potential sample brain drain rate more than doubled from 15 percent in the base scenario to 36 percent at the lower bound and 59 percent at the upper bound. Both new potential brain drain rates are statistically significant at the 1 percent level. The new potential brain drain rate as a result of the hypothetical scenario is also significantly higher than the brain drain rate that World Bank (2011) has estimated. Drawing from these findings here, it seems that foreign immigration policies can be a threat to the current Malaysian brain drain predicament. Skill-selective immigration policies are usually given to highly skilled foreign individuals to combat what most developed countries refer to as "reverse brain drain" to retain foreign talent in the country. In the context of the push-and-pull model, awarding these individuals permanent residence can be a strong pull factor for them to migrate into the country. Proponents of such a policy often championed the "internationalists" (Johnson, 1968) approach which argues that movement of skilled individuals across borders can benefit the world in a more efficient allocation of human capital. Opponents

of such policies however are known to have the "nationalists" (Patinkin, 1968) approach which argues that developed countries are accumulating these human capitals for their own benefit at the expense of poorer and developing countries. In any case, awarding these students permanent residence by the United States will be a huge threat to Malaysia's brain drain phenomenon.

On the other hand, an improvement of economic and political situation independently may result in a statistically significant reduced potential brain drain rate. In the former scenario, the lower bound of the new potential sample brain drain rate is reduced to 12 percent albeit not statistically significant, while the upper bound is reduced to 5 percent which is statistically significant at the 1 percent level. It is also the same for the latter case in which its upper bound potential sample brain drain rate is reduced to 8 percent. One conclusion that can be derived here is that economic improvements will seem to be a stronger pull factor compared to political improvements in Malaysia, at least according to the students surveyed here. This may seem to be a positive outlook that Malaysia should anticipate with the country currently embarking numerous economic restructuring programs through the Economic Transformation Program (ETP) which seeks to shape Malaysia into a high income country by the year 2020. [7] The findings here can also draw similarity with Harnoss (2011) which discovered that GDP growth rates as forecasted under the ETP program will reduce the emigration rate out of Malaysia.

A separate set of logistic regression analyses is estimated to identify students' characteristics that make a student more likely to change their mind if given a particular simulation. Again, in the same spirit of creating upper and lower bounds, two separate regressions are estimated for each scenario. In the permanent residence scenario, the first

[7] Details on the ETP can be found here: Pemandu. (2012), *ETP Annual Report 2012* .Kuala Lumpur: National Publications

identifies only students who became more inclined to remain in the United States permanently having initially answered that they are inclined to remain in the United States temporarily. The second logistic regression on the other hand also includes students who are initially more inclined to return to Malaysia immediately after completing their studies. In the other two scenarios where Malaysia's economic and political situation improves respectively, the first logistic regression identifies only students who became more inclined to return to Malaysia having initially answered that they are more inclined to remain in the United States temporarily. The second logistic regression also includes students who are initially more inclined to remain in the United States permanently.

It is thus found in all three separate scenarios that, students who desire to complete an education beyond a Bachelor's degree are more likely to change their mind. Again, in the context of the awarding permanent residence simulation by the US government, it can be further asserted here again that Malaysia's labor mismatch are likely push factors for these individuals. Even if these individuals may have been more inclined to return to Malaysia initially, awarding the permanent residence can drastically change their inclinations to be more inclined to remain in the US permanently. However, the findings from the latter simulations suggest that by improving both the political and economic situation in Malaysia, these highly skilled individuals who desire to complete their education beyond a Bachelor's degree can still be re-attracted into the country prompting them into a return migration.

Conclusion

The research in this paper has investigated the post-study inclinations of Malaysian students currently studying in the United States after they complete their desired level of education in the US by estimating a multinomial logistic regression. Students are asked if they are inclined to return to Malaysia, remain in the United States temporarily or remain in the United States permanently after completing their desired level of education in the United States. The potential brain drain rate that is between 13 percent figure in the full sample and the 15 percent in sub-sample of Malaysian students in the United States are in line with World Bank's estimate that one out of ten skilled Malaysians will elect to leave the country. Potential brain drain rate among non-scholars is also significantly higher than scholars.

Through the multinomial logistic regression analysis, a number of significant findings are discovered: (1) the higher the respondent's reservation wage to work in Malaysia the more inclined the respondent will be to remain in the United States (2) scholarships have a negative impact on student's inclination to remain in the United States (3) Students who did not attend a public national school in Malaysia are more inclined to remain in the United States (4) the higher the level of a respondent's perception on conditions in Malaysia the more inclined the respondent is to return to Malaysia (5) and the higher the level of a respondent's perception on conditions in the United States the more inclined the respondent is to remain in the United States (6) Bumiputera students do not exhibit a significant difference in terms of inclination to return to Malaysia compared to non-Bumiputera students.

The estimates of marginal effects of each variable indicate that scholarships are the strongest deterrents for students to be more inclined to remain in the United States. On the other

hand, being a student who did attend a public national in Malaysia increases the student's inclination to remain in the United States.

To account for the potential endogeneity in the scholarship and the internship variables, two separate sets bivariate probit simultaneous equations are estimated. It is found that even after controlling for endogeneity, students who had an internship experience in Malaysia are less likely to remain in the United States. In addition to that, it is found that the scholarship variable is not endogenous to a student's inclination to remain in the United States.

In addition, it is identified that students who desire to pursue an education level beyond a bachelor's degree to be the group of students most likely to change their mind if given a particular scenario. Furthermore, it is found that the relaxation of foreign immigration policies such as the awarding of permanent residence to Malaysian students abroad to be a genuine threat to the brain drain predicament in Malaysia. On the other hand, improvement in economic and political conditions in Malaysia can also significantly reduce the potential brain drain rate.

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Appendix

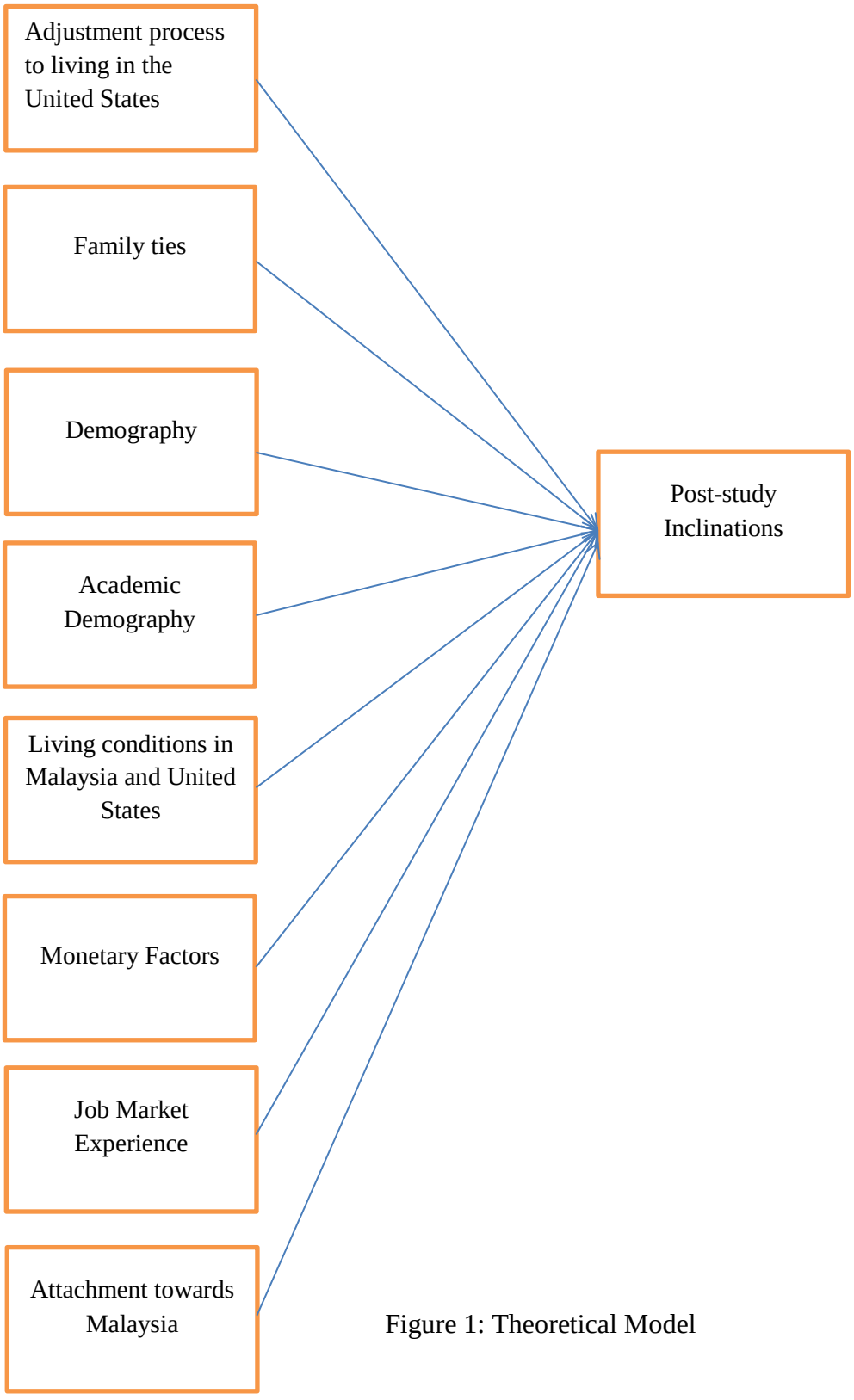

Figure 1: Theoretical Model

Table 1 : Breakdown of Post-study Inclinations Across Groups of Students

	Number of Observations	Return to Malaysia Immediately	Remain in the US Temporarily	Remain in the US permanently	Chi-2 Statistic
Full sample	588	0.36	0.51	0.13	
US-Bound Malaysian Students	142	0.39	0.53	0.08	4.60*
Malaysian students currently in the United States	446	0.35	0.50	0.15	
Scholars	344	0.53	0.43	0.04	132.71***
Non-scholars	244	0.11	0.63	0.26	

Notes:

*significant at 10 percent level

**significant at 5 percent level

***significant at 1 percent level

Table 2 : Proportion Test on Sample Brain Drain Rate Across Groups of Students

	US-bound Malaysian Students	Malaysian Students in the United States	Z-test
Potential Brain Drain Rate	0.08	0.15	2.11**
	Non-Scholars	**Scholars**	
	0.26	0.04	7.85***

Notes:

*significant at 10 percent level

**significant at 5 percent level

***significant at 1 percent level

Table 3: Summary Statistics for Variables Used In Regression Analysis

	N	Mean	Std Deviation
Minimum Wage Willing to Work In Malaysia	433	33127.79	37101.71
Expected Wage Differential US – Malaysia	431	29724.58	81845.44
Factor Analysis – Malaysia	425	1.43E-09	1
Factor Analysis – US (1)	425	-1.58E-09	1
Factor Analysis – US (2)	425	1.54E-09	1
Male (= 1)	446	0.57	0.50
Bumiputera (=1)	443	0.35	0.48
Scholar (=1)	449	0.56	0.50
Not From National School (=1)	445	0.25	0.43
Moral (=1)	439	0.71	0.45
Science Related Field (=1)	449	0.63	0.48
Beyond Bachelor's Degree (=1)	445	0.74	0.44
Rural (=1)	444	0.08	0.27
Had Internship Experience in US (=1)	414	0.20	0.40
Had Internship Experience in Malaysia (=1)	438	0.29	0.45
Factor Analysis – Adjustment to Life in the US	415	-9.22E-10	1
Relative In US (=1)	438	0.33	0.47
Family in Malaysia (=1)	412	0.85	0.36

Table 4 : Multinomial Logistic Regression Analysis for Students' Post-study Inclinations[+]

	Remain in the US Temporarily	Remain in the US Temporarily	Remain in the US Permanently	
Variables	*5 years or less*	*More than 5 years*		**Wald Test** [+++]
Minimum Wage Willing to Work In Malaysia[++]	2.60**	3.73***	3.79***	9.34**
	(1.20)	(1.20)	(1.20)	
Expected Wage Differential US – Malaysia[++]	-0.09	-0.03	-0.43	1.78
	(0.17)	(0.22)	(0.26)	
Factor Analysis – Malaysia	-0.95***	-1.01***	-1.74***	33.38***
	(0.25)	(0.30)	(0.32)	
Factor Analysis – US (1)	0.5***	0.71***	0.95***	13.81***
	(0.17)	(0.24)	(0.25)	
Factor Analysis – US (2)	0.26	0.09	0.74***	8.73**
	(0.21)	(0.28)	(0.28)	
Male (= 1)	-0.28	0.27	0.26	2.84
	(0.33)	(0.48)	(0.52)	
Bumiputera (=1)	0.38	-0.44	0.82	3.66
	(0.38)	(0.65)	(0.61)	
Scholar (=1)	-1.89***	-1.16*	-2.16***	21.73***
	(0.46)	(0.63)	(0.64)	
Not From National School (=1)	1.77***	1.65***	1.58**	14.19***
	(0.47)	(0.61)	(0.63)	
Moral (=1)	0.13	-1.15*	-1.82***	19.98***
	(0.50)	(0.61)	(0.59)	
Science Related Field (=1)	0.48	0.19	1.03**	4.87
	(0.33)	(0.46)	(0.51)	
Beyond Bachelor's Degree (=1)	1.09***	1.61**	0.10	12.90***
	(0.36)	(0.80)	(0.55)	
Rural (=1)	-0.75	-0.41	-0.76	1.72
	(0.54)	(0.91)	(1.02)	
Had Internship Experience in US (=1)	0.51	1.21*	1.06*	5.07
	(0.46)	(0.64)	(0.61)	
Had Internship Experience in Malaysia (=1)	-0.42	-1.39**	-1.08**	7.25*
	(0.38)	(0.61)	(0.5)	
Factor Analysis – Adjustment to Life in the US	0.14	0.44	1.00***	12.91***
	(0.18)	(0.30)	(0.3)	
Relative In US (=1)	-0.40	0.48	-0.43	4.10
	(0.41)	(0.59)	(0.56)	
Family in Malaysia (=1)	0.24	0.99	0.63	2.03
	(0.53)	(0.80)	(0.66)	
Constant	-0.36	-3.09**	-1.48	
	(0.97)	(1.32)	(1.1)	

Notes:

*significant at the 10 percent level

**significant at the 5 percent level

***significant at the 1 percent level

[+]standard errors are robust

[++] in 100,000 PPP dollars

[+++]Wald Test; Ho: coefficient is equal to zero at each category

Table 5 : Logistic Regression Analysis for Students with Scholarships[+]

Dependent Variable : Scholar	
Variables	
Male (= 1)	-0.46**
	(0.23)
Bumiputera (=1)	2.24***
	(0.27)
Rural (=1)	-1.12***
	(0.28)
Not From National School (=1)	0.24
	(0.25)
Science Related Field (=1)	0.34
	(0.44)
Constant	-0.02
	(0.24)
Pseudo R2	0.22

Notes:

*significant at the 10 percent level

**significant at the 5 percent level

***significant at the 1 percent level

[+] standard errors are robust

Table 6 : Regression Analysis for Students' Reservation Wage[+]

Dependent Variable : Minimum Annual Income Student Willing to Work In Malaysia[++]	
Variables	
Age	-727.71
	(733.20)
Male (= 1)	8692.83**
	(3420.63)
Beyond Bachelor's Degree (=1)	8570.64**
	(3953.58)
Scholar (=1)	-13006.53*
	(4087.34)
Bumiputera (=1)	-5036.49
	(4250.68)
Not From National School (=1)	-7938.73
	(4158.79)
Rural (=1)	3861.59
	(6464.55)
Factor Analysis – Malaysia	158.46
	(1907.52)
Constant	46849.30***
	(16524.10)
R2	0.05

Notes:
*significant at the 10 percent level
**significant at the 5 percent level
***significant at the 1 percent level
[+] standard errors are robust

Table 7 : Logistic Regression Analysis for Student's Inclination to Remain in the United States Temporarily and Permanently as well as Marginal Effects of each Independent Variables[+]

Dependent Variable:	***Remain in the US***	
	Coefficients	***Marginal Effects***
Minimum Wage Willing to Work In Malaysia[++]	2.90**	0.04***
	(1.1)	(0.01)
Expected Wage Differential US – Malaysia[++]	-0.12	-0.01
	(0.15)	(0.20)
Factor Analysis – Malaysia	-1.07***	-0.14***
	(0.24)	(0.03)
Factor Analysis – US (1)	0.56***	0.07***
	(0.17)	(0.02)
Factor Analysis – US (2)	0.30	0.04
	(0.2)	(0.03)
Male (= 1)	-0.16	-0.02
	(0.32)	(0.04)
Bumiputera (=1)	0.39	0.05
	(0.36)	(0.05)
Scholar (=1)	-1.81***	-0.23***
	(0.44)	(0.05)
Not From National School (=1)	1.77***	0.23***
	(0.48)	(0.06)
Moral (=1)	-0.41	-0.05
	(0.47)	(0.06)
Science Related Field (=1)	0.48	0.06
	(0.32)	(0.04)
Beyond Bachelor's Degree (=1)	1.03***	0.13***
	(0.34)	(0.04)
Rural (=1)	-0.68	-0.09
	(0.54)	(0.07)
Had Internship Experience in US (=1)	0.62	0.08
	(0.44)	(0.06)
Had Internship Experience in Malaysia (=1)	-0.67**	-0.09
	(0.37)	(0.05)
Factor Analysis – Adjustment to Life in the US	0.28	0.04
	(0.17)	(0.02)
Relative In US (=1)	-0.25	-0.03
	(0.39)	(0.05)
Family in Malaysia (=1)	0.35	0.04
	(0.52)	(0.07)
Constant	0.19	
	(0.96)	
Pseudo R2	0.38	

Notes:

*significant at the 10 percent level

**significant at the 5 percent level

***significant at the 1 percent level

[+]standard errors are robust

[++]in 100,000 PPP dollars

Table 8 : Recursive Bivariate Probit Simultaneous Equation to Examine Endogeneity Between Inclinations to Remain in the US and Students' Having Internship Experiences in Malaysia[+]

Dependent Variable:	***Y= Remain in the US***	***Y= Had Internship Experiences in Malaysia***
Minimum Wage Willing to Work In Malaysia[++]	0.13**	0.28
	(0.05)	(0.21)
Expected Wage Differential US – Malaysia[++]	-0.64	0.32
	(0.60)	(0.63)
Factor Analysis – Malaysia	-0.42***	0.12
	(0.12)	(0.09)
Factor Analysis – US (1)	0.21**	-0.09
	(0.09)	(0.08)
Factor Analysis – US (2)	0.12	-0.04
	(0.09)	(0.08)
Male (= 1)	-0.02	0.17
	(0.15)	(0.15)
Bumiputera (=1)	0.05	-0.18
	(0.19)	(0.18)
Scholar (=1)	-0.81***	-0.03
	(0.2)	(0.18)
Not From National School (=1)	0.92**	0.12
	(0.22)	(0.18)
Moral (=1)	-0.22	0.01
	(0.21)	(0.19)
Science Related Field (=1)	0.17	-0.13
	(0.16)	(0.15)
Beyond Bachelor's Degree (=1)	0.44**	-0.10
	(0.17)	(0.17)
Rural (=1)	-0.44*	-0.47
	(0.26)	(0.31)
Had Internship Experience in US (=1)	0.30	0.19
	(0.18)	(0.17)
Had Internship Experience in Malaysia (=1)	-1.80***	
	(0.23)	
Factor Analysis – Adjustment to Life in the US	0.28***	0.39***
	(0.08)	(0.08)
Relative In US (=1)	-0.13	0.03
	(0.18)	(0.17)
Family in Malaysia (=1)	0.20	0.09
	(0.23)	(0.22)
Constant	0.49	-0.71**
	(0.43)	(0.35)
Rho	0.90	
Wald Test Statistic	7.13***	

Notes:

*significant at the 10 percent level

**significant at the 5 percent level

***significant at the 1 percent level

[+]standard errors are robust

[++] in 100,000 PPP dollars

Table 9 : Recursive Bivariate Probit Simultaneous Equation to Examine Endogeneity Between Inclinations to Remain in the US and Students' Being A Scholar[+]

Dependent Variable	***Y= Remain in the US***	***Y= Scholar***
Minimum Wage Willing to Work In Malaysia[++]	1.63***	-0.91
	(0.62)	(0.58)
Expected Wage Differential US – Malaysia[++]	0.08	0.10
	(0.09)	(0.10)
Factor Analysis – Malaysia	-0.62***	0.23
	(0.12)	(0.11)
Factor Analysis – US (1)	0.31***	0.03
	(0.09)	(0.09)
Factor Analysis – US (2)	0.17*	0.09
	(0.10)	(0.09)
Male (= 1)	-0.06	
	(0.18)	
Bumiputera (=1)	0.12	-0.17
	(0.25)	(0.17)
Scholar (=1)	-0.68	0.88***
	(0.62)	(0.20)
Not From National School (=1)	1.10***	-0.85***
	(0.28)	(0.18)
Moral (=1)	-0.32	0.80***
	(0.29)	(0.20)
Science Related Field (=1)	0.28	0.06
	(0.18)	(0.17)
Beyond Bachelor's Degree (=1)	0.59***	0.21
	(0.19)	(0.19)
Rural (=1)	-0.37	-0.03
	(0.30)	(0.31)
Had Internship Experience in US (=1)	0.38	-0.24
	(0.24)	(0.21)
Had Internship Experience in Malaysia (=1)	-0.37*	-0.05
	(0.20)	(0.18)
Factor Analysis – Adjustment to Life in the US	0.20**	-0.24**
	(0.10)	(0.09)
Relative In US (=1)	-0.08	-0.66***
	(0.24)	(0.18)
Family in Malaysia (=1)	0.26	-0.21
	(0.27)	(0.23)
Constant	-0.12	0.16
	(0.56)	(0.36)
Rho	-0.20	
Wald Test Statistic	0.54	

Notes:

*significant at the 10 percent level

**significant at the 5 percent level

***significant at the 1 percent level

[+]standard errors are robust

[++] in 100,000 PPP dollars

Table 10 : Logistic Regression Analysis On Students Who Change Their Minds and Potential Brain Drain Rates Across Different Hypothetical Scenarios

	Hypothetical Scenarios:					
	If granted permanent residence (Y = became more inclined to remain in the US permanently)		**If Malaysia's economic situation is better** (Y= became more inclined to return to Malaysia)		**If Malaysia's political situation is better** (Y = became more inclined to return to Malaysia)	
Student Characteristics	First Specification[+]	Second Specification[++]	First Specification[+]	Second Specification[+++]	First Specification[+]	Second specification[++]
Science Related Field (=1)	-0.26	-0.40	0.42	0.39	0.23	0.28
	(0.32)	(0.28)	(0.27)	(0.26)	(0.27)	(0.26)
Beyond Bachelor's Degree (=1)	1.85***	0.86**	0.87***	0.57**	0.91***	0.80**
	(0.62)	(0.38)	(0.32)	(0.28)	(0.34)	(0.31)
Bumiputera (=1)	-0.02	0.04	0.27	0.18	-0.19	-0.33
	(0.40)	(0.34)	(0.32)	(0.30)	(0.33)	(0.32)
Not from national school (=1)	1.07***	0.63**	0.51*	0.49*	0.64**	0.64**
	(0.34)	(0.32)	(0.28)	(0.27)	(0.29)	(0.28)
Scholar (=1)	-0.28	0.11	-1.05***	-1.03***	-0.66**	-0.56**
	(0.37)	(0.33)	(0.30)	(0.28)	(0.30)	(0.29)
Constant	-3.44	-2.17	-1.65	-1.10	-1.80	-1.52
	(0.69)	(0.47)	(0.40)	(0.36)	(0.42)	(0.39)
Pseudo R2	0.10	0.04	0.07	0.07	0.06	0.06
			Sample Brain Drain Rate			
Lower Bound	0.36***		0.12		0.14	
(change in parentheses)	(+0.21)		(-0.03)		(-0.01)	
Upper Bound	0.59***		0.05***		0.08***	
(change in parentheses)	(+0.45)		(-0.10)		(-0.07)	
Base scenario brain drain rate			0.15			

Notes:

*significant at 10 percent level

**significant at 5 percent level

***significant at 1 percent level

[+] includes only students who are initially inclined to remain in the US temporarily

[++] also includes students who are initially inclined to return to Malaysia immediately

[+++] also includes students who are initially inclined to remain in the US permanently

Table 11 : Factor Analysis for Adjustment Process to Living in the United States[+]

Retained Factor(s)[++]	**Eigenvalue**	**Relative Weight to Total Variance**
Factor (1) - Adjustment to Life in the US	1.47	0.73
Rotated Factor Loadings[+++]	**Weight and Correlations between each component and factor**	**Unique Variance**
English Proficiency Level	0.86	0.27
Perceived Adjustment Level	0.86	0.27

Notes :

[+]principle-component factors

[++]orthogonal varimax

[+++]components used in creating the factor

Table 12 : Factor Analysis for Students' Perception on Living Conditions in Malaysia[+]

Retained Factor(s)[++]	**Variance**	**Relative Weight to Total Variance**
Factor (1) - Living Conditions in Malaysia	3.81	0.44
Rotated Factor Loadings[+++]	**Weight and Correlations between each component and factor**	**Unique Variance**
Economic Condition in Malaysia	0.68	0.54
Political Conditions in Malaysia	0.70	0.51
Inter-racial Relationship in Malaysia	0.56	0.69
Easiness to Raise a Family in Malaysia	0.69	0.53
Job Prospect in Malaysia	0.58	0.67
Culture in Malaysia	0.52	0.73
Quality of Education in Malaysia	0.73	0.47
Gender Equality in Malaysia	0.69	0.53
Sexuality Justice in Malaysia	0.69	0.53

Notes :

[+]principle-component factors

[++]orthogonal varimax

[+++]components used in creating the factor

Table 13 : Factor Analysis for Students' Perception on Living Conditions in the United States[+]

Retained Factor(s)[++]	**Variance**		**Relative Weight to Total Variance**
Factor (1) - Living Conditions in the United States	2.32		0.26
Factor (2) - Living Conditions in the United States	2.07		0.23
Rotated Factor Loadings[+++]	**Weight and Correlations between each component and factor**		**Unique Variance**
	Factor (1)	Factor(2)	
Economic Condition in United States	0.62	0.30	0.53
Political Conditions in United States	0.59	0.37	0.52
Inter-racial Relationship in United States	0.46	0.36	0.66
Easiness to Raise a Family in United States	0.70	0.05	0.51
Job Prospect in United States	0.61	0.15	0.61
Culture in United States	0.58	-0.01	0.67
Quality of Education in United States	0.41	0.48	0.60
Gender Equality in United States	0.09	0.87	0.23
Sexuality Justice in United States	0.11	0.84	0.28

Notes:

[+]principle-component factors

[++]orthogonal varimax

[+++]components used in creating the factor

	Survey Questions
1.	In order to participate in this online survey, you must be able to identify yourself as one of the following interest groups. Select your category. I am a Malaysian student currently pursuing my tertiary education in the United States I am a US-bound Malaysian student who is certain to pursue my tertiary education in the United States but has yet to begun studying in the United States
2.	What is the highest desired level of education that you intend to complete? Associate Degree Bachelor's Degree Master's Degree Advanced Graduate Work or PHD
3(i)	After completing your highest desired level of study in the United States, are you inclined to … return to Malaysia immediately remain in the United States temporarily before returning to Malaysia remain in the United States permanently
3(ii)	If you are inclined to remain in the United States temporarily how long do you plan to remain in the United States before returning to Malaysia?
4.	What is the minimal annual income that you will be willing to work for in Malaysia? (answer in Ringgits)
5.	How much annual income do you expect to earn each year for the first 5 years in the United States? (answer in US dollars)
6.	How much annual income do you expect to earn each year for the first 5 years in Malaysia? (answer in Ringgits)
7.	What is your gender? Male Female
8.	What is your age?

9. What is your ethnicity?

Chinese
Malay
Indian
Native Malaysian
Others

10. On the scale of 1 to 5, 1 one being the weakest and 5 the strongest, how much do you rate your English speaking abilities?

1 – Weak
2
3 – Moderate
4
5 – Strong

11. How would you consider the environment you grew up mostly in?

Rural
Suburban
Urban

12. What type of secondary/high school did you go to for the most of your secondary schooling year?

National Secondary School
Private Secondary School
Chinese Vernacular Secondary School
Indian Vernacular Secondary School
Technical Secondary School (Sekolah Menengah Teknik)
Science Secondary School (Maktab Rendah Sains MARA or similar)
Residential School (Sekolah Berasrama Penuh)
Homeschooled
High School outside Malaysia

13. Are you a scholar sponsored by the Malaysian Government?

Yes
No

14. Are you a scholar sponsored by any other institutions in Malaysia?

Yes
No

15. Have you gotten an internship experience in Malaysia?

Yes
No

16. Have you gotten an internship experience in the United States?

Yes
No

17. Do you have siblings currently living or studying in the United States?

Yes
No

18. Do you have other relatives living permanently in the United States?

Yes
No

19. Are most of your immediate family members currently living in Malaysia?

Yes
No

20. On the scale of 1 to 5, with 1 being the weakest and 5 being the strongest, how do you rate your adjustment to the American culture and lifestyle?

1 – Weak
2
3 – Moderate
4
5 – Strong

21. On the scale of 1 to 10 with 1 being the worst and 10 being the best how would you rate …

Economic Conditions in Malaysia
Economic Conditions in the United States
Political Conditions in Malaysia
Political Conditions in the United States
Inter-racial Relationships in Malaysia
Inter-racial Relationships in the United States
Easiness to raise a family in Malaysia
Easiness to raise a family in the United States
Your job prospect in Malaysia
Your job prospect in the United States
Malaysia's culture
United States' culture
The quality of education in Malaysia
The quality of education in the United States
Gender equality in Malaysia
Gender equality in the United States
Sexuality justice in Malaysia
Sexuality justice in the United States

22. Do you think you have a moral duty to return to Malaysia?

Yes
No

23. On the scale of 1 to 5 how much do you agree with the statement "I would be more inclined to return to Malaysia if the political situation in Malaysia improves"?

1- Strongly Disagree
2- Disagree
3- Neutral
4- Agree
5- Strongly Agree

24. On the scale of 1 to 5 how much do you agree with the statement "I would be more inclined to return to Malaysia if the economic situation in Malaysia improves"?

1- Strongly Disagree
2- Disagree
3- Neutral
4- Agree
5- Strongly Agree

25. On the scale of 1 to 5 how much do you agree with the statement "I would be more inclined to remain in the United States permanently if am granted a permanent resident status in the United States"?

1- Strongly Disagree
2- Disagree
3- Neutral
4- Agree
5- Strongly Agree